
Operating modes

There are sixteen possible RS-232-C operating modes with three basic common modes of operation which correspond to three types of equipment connected to the DAC. The three modes are: modem, terminal, and host. Host mode is a subset of the terminal mode, which only suppresses the prompts at the terminal.

The fourth mode, gateway, is a subset of the modem mode and is not normally used. This mode is useful if the attached modems do not have Ring Indicator lead. The application used is inbound modem pooling.

12 Operating modes

The different modes enable the DAC to connect to different types of devices such as modems (modes 0, 1, 2, and 3), gateways (modes 4, 5, 6, and 7), hosts (modes 8, 9, 10, and 11), and terminals (modes 12, 13, 14, and 15). After selecting the appropriate group (that is, modem, gateway, host, or terminal), the installer should study the four different modes in that group to make the

proper selection. See [Table 2](#).

Table 2
DAC mode of operation selection (Part 1 of 3)

Service changeable downloadable parameters (LD11)					
Operation mode	Modem/ Gateway/ Host/KBD	Forced DTR*	Hotline	Type of device to be connected	Group selection
DEM	PRM	DTR	HOT		
0 (DTE)	OFF "Host On" (Ring Indicator — RI)	OFF Not Forced	OFF Not Hotline	Modem Pool inbound and outbound (similar to Synchronous / Asynchronous Data Module (SADM) in inbound) MSB by RI	Modes 0, 1, 2, and 3 are for RS232 modem connectivity
1 (DTE)	OFF "Host On" (RI)	OFF Not Forced	ON Hotline	Modem Pool inbound only (Hotline by RI- similar to SADM)	
2 (DTE)	OFF "Host On" (RI)	ON Forced	OFF Not Hotline	Modem Pool inbound and outbound (for Hayes 1200 modem) MSB by RI	
3 (DTE)	OFF "Host On" (RI)	ON Forced	ON Hotline	Modem Pool inbound only (Hotline for Hayes 1200 modem only)	
4 (DTE)	ON "Keyboard Dialing (KBD) On" (No RI)	OFF Not Forced	OFF Not Hotline	Gateway inbound and outbound (DTR is OFF in idle state) MSB by Carrier Detect (DCD)	Modes 4, 5, 6, and 7 are for RS232 Gateway connectivity
5 (DTE)	ON "KBD On" (No RI)	OFF Not Forced	ON Hotline	Gateway inbound only (Hotline by DCD: ON for Hotline OFF for Virtual Leased Line (VLL))	
* Not prompted for Type = R422. Defaults for Type = R422: DEM = DCE and DTR = OFF.					

Table 2
DAC mode of operation selection (Part 2 of 3)

Service changeable downloadable parameters (LD11)					
Operation mode	Modem/ Gateway/ Host/KBD	Forced DTR*	Hotline	Type of device to be connected	Group selection
DEM	PRM	DTR	HOT		
6 (DTE)	ON "KBD On" (No RI)	ON Forced	OFF Not Hotline	Gateway inbound and outbound (DTR is on in idle state) MSB by DCD	
7 (DTE)	ON "KBD On" (No RI)	ON Forced	ON Hotline	Gateway inbound only (Hotline by DCD: ON for Hotline OFF for VLL) (DTR is ON in idle state)	
8 (DCE)	OFF "Host On" (prompts off)	OFF Not Forced	OFF Not Hotline	Outbound to Host (similar to Multi Channel Data System (MCDS)) Prompt PBDO = OFF/ ON	Modes 8 and 9 are for RS422 Host connectivity
9 (DCE)	OFF "Host On" (prompts off)	OFF Not Forced	On Hotline	Host Hotline by DTR	
10 (DCE)	OFF "Host On" (prompts off)	ON Forced	OFF Not Hotline	Host similar to MCDS but does not require DTR to be ON	Modes 8, 9, 10, and 11 are for RS232 Host connectivity
11 (DCE)	OFF "Host On" (prompts off)	ON Forced	On Hotline	Continuous Hotline mode when DTR is ON (VLL)	
* Not prompted for Type = R422. Defaults for Type = R422: DEM = DCE and DTR = OFF.					

Table 2
DAC mode of operation selection (Part 3 of 3)

Service changeable downloadable parameters (LD11)					
Operation mode	Modem/ Gateway/ Host/KBD	Forced DTR*	Hotline	Type of device to be connected	Group selection
DEM	PRM	DTR	HOT		
12 (DCE)	ON "KBD On" (prompts on)	OFF Not Forced	OFF Not Hotline	Terminal similar to Asynchronous/Synchronous Interface Module (ASIM) when set to Not Forced DTR and Not Hotline Prompt PBDO = OFF/ON	Modes 12 and 13 are for RS422 Terminal connectivity
13 (DCE)	ON "KBD On" (prompts on)	OFF Not Forced	On Hotline	Terminal similar to ASIM when set to Not Forced DTR and Hotline	
14 (DCE)	ON "KBD On" (prompts on)	ON Forced	OFF Not Hotline	Terminal similar to ASIM when set to forced DTR and Not Hotline	Modes 12, 13, 14, and 15 are for RS232 Terminal connectivity (similar to ASIM)
15 (DCE)	ON "KBD On" (prompts on)	ON Forced	On Hotline	Continuous Hotline when DTR is ON	
* Not prompted for Type = R422. Defaults for Type = R422: DEM = DCE and DTR = OFF.					

Selecting the proper mode for Modem connectivity

Select modes 0, 1, 2, and 3 when the DAC is connected to different types of modems for inbound and outbound modem pooling. In these modes, the DAC operates as a DTE, monitors the DSR, DCD, and RI control leads, and drives the DTR lead. No menus are given and no characters are echoed when DCD is OFF. All prompts and messages are enabled for inbound calls and disabled for outbound calls.

In modes 0 and 1, the DAC drives the DTR lead OFF when in the idle state, and ON when processing an incoming or outgoing call.

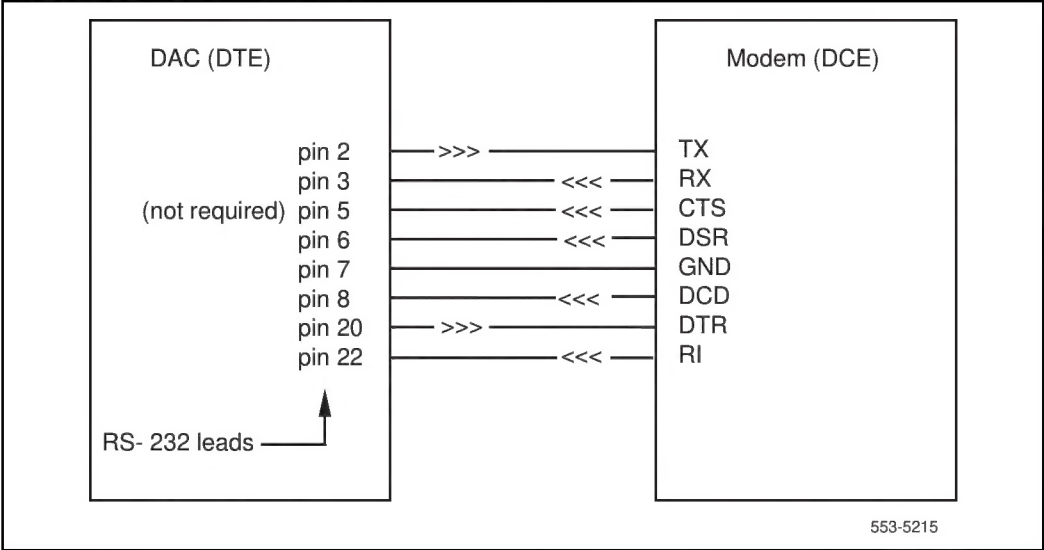
In modes 2 and 3, the DAC drives the DTR lead ON except when the call is being disconnected. At disconnect, DTR is dropped for 0.2 seconds and then returns to ON.

In the case of outbound modem pooling, the DAC answers the data call and drives the DTR lead ON (modes 0 and 1). Then the calling data module and the DAC form a transparent link between the calling DTE and the modem. The DTE user may then enter the appropriate commands to the modem for dialing a remote modem. When the call is established, the modem may cause the DAC to disconnect the call by dropping either DSR or DCD.

In the case of inbound modem pooling, the modem must drive the RI lead ON to activate the DAC. Then the DAC responds by driving the DTR lead ON and making the unit busy for outbound calls (modes 0 and 1). The modem is expected to turn DCD to ON within 35 seconds; otherwise, the call will be dropped by the DAC. If the modem turns DCD ON before the 35-second timeout, the DAC validates the incoming call and prepares to accept <CR> from the remote modem for autobaud.

See [Figure 2](#) for more details.

Figure 2
DAC to modem connectivity



Mode 0

This mode should be selected when the DAC is connected to a modem, except Hayes-1200, for inbound and outbound modem pooling (see modes 2 and 3 for Hayes-1200 modem). The modem used should have the following features:

Auto-answer capability This feature is required when the modem is used for inbound modem pooling. It allows the modem to drive the RI lead ON when ringing is present at its tip and ring. In addition, the modem should auto-answer after the first ringing cycle if the DTR lead is ON (most modems support this feature).

Dynamic control of DCD This feature must be supported by all modems to be connected to the DAC. It allows the modem to drive the DCD lead ON when the carrier is detected and OFF when the carrier is absent (most modems support this feature).

Auto-dial capability This feature is required when the modem is used for outbound modem pooling. It allows the modem to go off-hook and dial the remote number (such as Smartmodem Hayes-2400 or Bizcomp).

Auto-reset capability This feature is required when the modem is used for outbound modem pooling. The modem should execute auto-reset when the DTR lead goes OFF. As a result, the modem must reset all its internal parameters to the default values. This feature prevents the users of the modem pool from modifying the modem's default parameters to inappropriate values.

Configuring modems for mode 0

To configure Hayes modem 2400, enter the following commands:

```
AT&D2&W
ATV1&W
ATQ&W
ATE1&W
ATSO= 1&W
AT&C1&S1&W
AT&J&W
ATB1&W
AT&D3&W
```

Since the default parameters are programmable using commands, there is no guarantee that users will not change them.

To configure Bizcomp 1200 modem, set the following parameters in LD11:

DEM	DTE
PRM	OFF
DTR	OFF
HOT	OFF

- To configure MULTI MODEM 224E modem, set the configuration switches as follows:

switches 3 and 8 to DOWN position

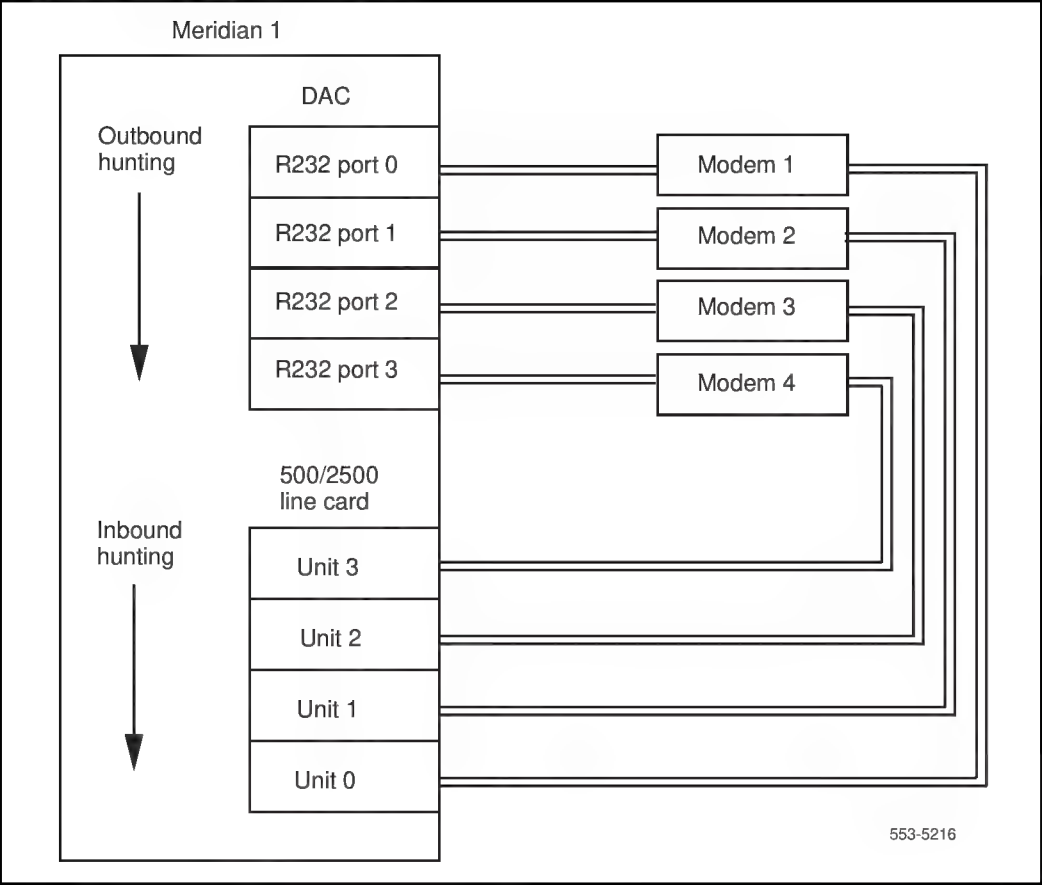
- all other switches to UP position. Switch 7 should be UP when using RJ-11 jack.

Programing DAC for mode 0 in service change LD11

When used for inbound or outbound Modem Pool only, the DAC can be configured as R232 in LD11. When used for both inbound and outbound Modem Pool, the DAC must be configured as R232; station hunting for the outbound modem access should be in the opposite direction to the 500/2500 station hunting for the inbound modem access. See [Figure 3](#) for more details.

Note: If Call Detail Recording (CDR) is required, use separate outbound and inbound Modem Pools.

Figure 3
DAC to Modem Pool connectivity



Mode 1

This mode should be selected when the DAC is connected to an auto-answer modem for inbound Hotline operation. In this mode, the DAC automatically executes Hotline operation when RI is driven ON by the modem. The modem used should have the following features:

Auto-answer capability This feature is required when the modem is used for inbound modem pooling. It allows the modem to drive the RI lead ON when ringing is present at its tip and ring. In addition, the modem should auto-answer after the first ringing cycle if the DTR lead is ON (most modems support this feature).

Dynamic control of DCD This feature must be supported by all modems to be connected to the DAC. It allows the modem to drive the DCD lead ON when the carrier is detected and OFF when the carrier is absent (most modems support this feature).

The baud rate of the Hotline call is determined by switches 6 and 8, and the Meridian 1 should be programmed to allow inbound modem calls only.

Configuring modems for mode 1

Most dumb modems can be configured for this mode. The modem must be able to auto-answer and have dynamic control of DCD as described in mode 0. Smart modems can also be used if set to the dumb mode of operation. Hayes 2400, Bizcomp 1200, and MULTI MODEM 224E can be used when set up as follows:

- For Hayes 2400, the dumb-mode-strap should be moved to the dumb-position (see Hayes manual).
- For Bizcomp 1200 modem, set the following parameters in LD11:

DEM	DTE
PRM	OFF
DTR	OFF
HOT	ON

Hayes 1200 cannot be used in this mode when the default parameters are selected (see mode 3).

Programing DAC for mode 1 in service change LD11

The DAC must be configured as R232 (the Autodial feature key is used for this mode). The DAC must not be configured as an Asynchronous Data Module (ADM) trunk.

Mode 2

This mode should be selected when the DAC is connected to a Hayes-1200 modem for inbound and outbound modem pooling. This mode is created specially to resolve some problems that were encountered with this modem, namely, the auto-reset implementation. When this modem is operating in the auto-reset mode, it drives both RI and DCD ON as long as DTR is OFF. This problem was resolved by driving DTR ON in the idle state, and OFF for 0.2 seconds, and then ON when an established call is dropped. The DAC also ignores the status of RI and DCD for approximately 2 seconds after a call is released to avoid false inbound call initiation.

Configuring Hayes 1200 for mode 2

To configure this modem, set the following parameters in LD11:

DEM	DTE
PRM	OFF
DTR	ON
HOT	OFF

To configure this modem, set the configuration switches as follows:

- switches 3, 8, and 10 to DOWN position
- all other switches to UP position. Switch 7 should be UP when using RJ-11 jack.

Programing DAC for mode 2 in service change LD11

When used for inbound or outbound Modem Pool only, the DAC can be configured as R232 in LD11. When used for both inbound and outbound Modem Pool, the DAC must be configured as R232. When the DAC is programmed as station hunting, outbound modem access should be in the opposite direction to the 500/2500 station hunting for the inbound modem access.

Note: If Call Detail Recording (CDR) is required, use separate outbound and inbound Modem Pools.

Mode 3

This mode should be selected when the DAC is connected to a Hayes-1200 modem for inbound Hotline operation. It is recommended that mode 1 be used for inbound Hotline operations if some other modem is available. However, if only Hayes-1200 modems are available, then this mode could be used as a last resort.

Configuring Hayes 1200 for mode 3

For Hayes 1200 modem, set the following parameters in LD11:

DEM	DTE
PRM	OFF
DTR	ON
HOT	ON

To configure this modem, set the configuration switches as follows:

- all switches to UP position, except for switch 4. Switch 7 should be UP when using RJ-11 jack.

Programing DAC for mode 3 in service change LD11

The DAC must be configured as R232 (the Autodial feature is used for this mode). The DAC must not be configured as an ADM trunk.

Selecting the proper mode for Gateway connectivity

Select modes 4, 5, 6, and 7 when the DAC is connected to different types of gateways for inbound and outbound operations. The term gateway refers to any equipment that has the following characteristics:

- The equipment must be a DCE.
- The equipment does not drive RI lead (optional, the DAC ignores this lead).
- The equipment must drive DCD lead dynamically.
- The equipment drives DSR lead (optional).
- The equipment can monitor the DTR lead (optional, depending on the mode selected).

In modes 4, 5, 6, and 7, the DAC:

- operates as a DTE
- monitors the DSR
- monitors DCD control leads
- drives the DTR lead

The RI lead is ignored. No menus or prompts are given when DCD is OFF. All prompts and messages are enabled for inbound calls and disabled for outbound calls. See [Figure 4](#) for more details.

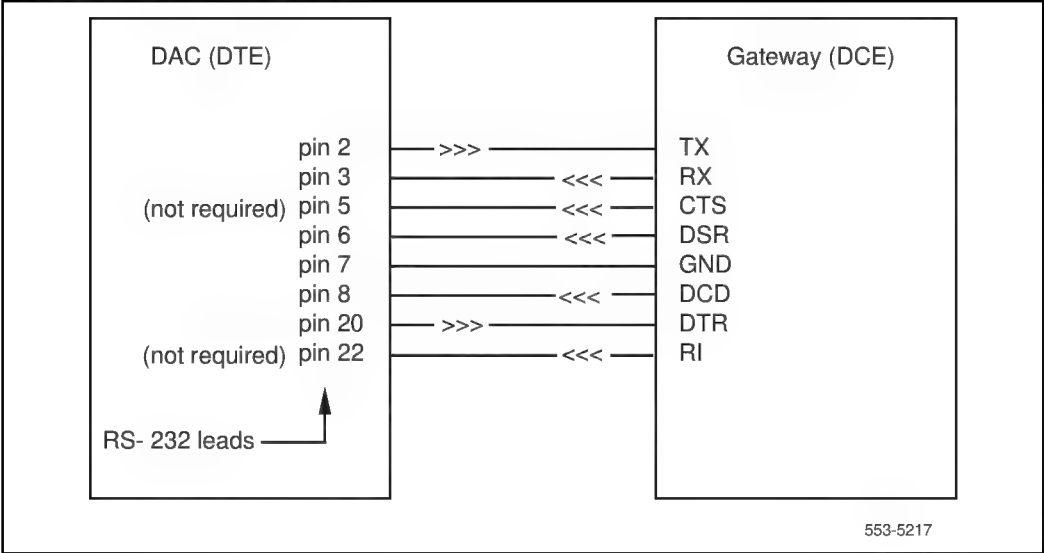
In modes 4 and 5, the DAC drives the DTR lead OFF in the idle state, and ON when processing an incoming or outgoing call.

In modes 6 and 7, the DAC drives the DTR lead ON except when the call is being disconnected. At disconnect, DTR is dropped for 0.2 seconds and then returns to ON.

With outbound gateway access, the DAC answers the data call and drives the DTR lead ON (modes 4 and 5; in modes 6 and 7, DTR is already ON). Then the calling data module and the DAC form a transparent link between the calling Data Module (DM) and the gateway. The DM user may then enter the appropriate commands to the gateway to establish a data call. The DAC expects the gateway to drive DCD ON (modes 4 and 5 only) within 35 seconds. If the gateway fails to do so, the DAC turns DTR OFF and drops the call. When the call is established, the gateway may cause the DAC to disconnect the call by dropping either DSR or DCD.

For inbound gateway access, the gateway must drive the DCD lead ON to activate the DAC. When the DAC receives this signal, it drives the DTR lead ON, makes the unit busy for outbound calls (modes 4 and 5; in modes 6 and 7, DTR is already ON), and prepares to accept <CR> for autobaud. The DAC expects DCD to remain ON for as long as the data call is established.

Figure 4
DAC to Gateway connectivity



Mode 4

This mode should be selected when the DAC is connected to a gateway for inbound and outbound operation. The characteristics of the gateways to be used with this mode are:

Auto-answer capability This feature is required when the gateway is used for inbound operation. It allows the gateway to drive the DCD lead ON when the inbound data call is pending. In addition, the gateway should auto-answer when the DTR lead is ON.

Dynamic control of DCD This feature must be supported by all gateways to be connected to the DAC. It allows the gateway to drive the DCD lead ON when the data call is established, and OFF when the data call is disconnected.

In the inbound operation, the DAC drives the DTR lead OFF until the gateway drives the DCD lead ON. Then, the DAC drives DTR ON and makes that unit busy for any outbound calls. After that, the user of the gateway may enter the proper commands to establish a local data call to any DM.

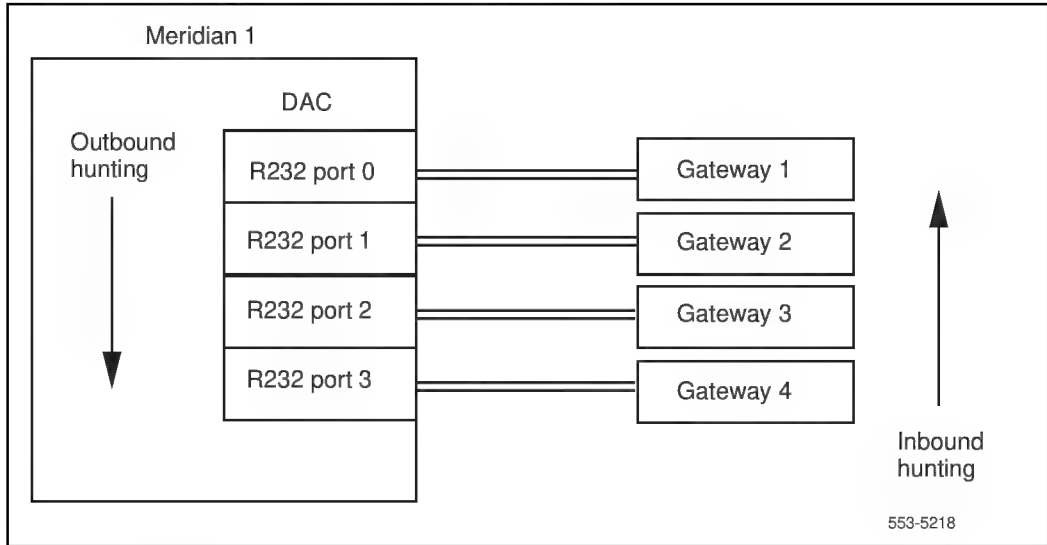
In the outbound operation, the DAC drives the DTR lead OFF until another DM calls it for outbound accessing. The DAC answers the data call and drives the DTR lead ON. The calling DM is then transparently connected to the gateway. The DAC requires the gateway to drive the DCD lead to ON within 35 seconds after the outbound call is connected. Call disconnection may be initiated by dropping DCD (or DSR) from ON to OFF.

Programing DAC for mode 4 in service change LD11

When used for inbound or outbound gateway access, the DAC can be configured as R232 in LD11. When used for both inbound and outbound gateway access, the DAC must be configured as R232. When the DAC is programmed as station hunting, outbound gateway access should be in the opposite direction to the hunting for inbound gateway access. See [Figure 5](#) for more details.

Note: If CDR is required, use separate outbound and inbound gateway access.

Figure 5
DAC to Gateway—Inbound/Outbound connectivity



Mode 5

This mode should be selected when the DAC is connected to an auto-answer gateway for inbound Hotline operation. In this mode, the DAC automatically executes Hotline operation when DCD is driven ON by the gateway. If the DM being called by the Hotline operation is busy or not answering, the DAC will place repeated Hotline calls as long as the DCD lead is ON until the called unit answers. The gateway used in this mode should have the following features:

Auto-answer capability This feature is required when the gateway is used for inbound operation. It allows the gateway to drive the DCD lead ON when the inbound data call is pending. In addition, the gateway should auto-answer when the DTR lead is ON.

Dynamic control of DCD This feature must be supported by all gateways to be connected to the DAC. It allows the gateway to drive the DCD lead ON when the data call is established, and OFF when the data call is disconnected.

The baud rate of the Hotline call is determined by the AUTB and BAUD parameters in LD11. The Meridian 1 should be programmed to allow inbound modem calls only.

Programing DAC for mode 5 in service change LD11

The DAC must be configured as R232 (the Autodial feature is used for this mode). The DAC must not be configured as an ADM trunk.

Mode 6

This mode should be selected when the DAC is connected to a gateway that requires DTR to be ON always except during call disconnection. In this mode, the DAC can be used for both inbound and outbound operations. The operation of this mode is similar to mode 4 except for the following:

- The DTR lead is ON in the idle state.
- The DTR lead will be dropped OFF for 0.2 seconds when an established call is disconnected.

Programing DAC for mode 6 in service change LD11

When used for inbound or outbound gateway access, the DAC can be configured as R232 in LD11. When used for both inbound and outbound gateway access, the DAC must be configured as R232. When the DAC is programmed as station hunting, outbound gateway access should be in the opposite direction to the hunting for inbound gateway access. See [Figure 5](#) for more details.

Note: If CDR is required, use separate outbound and inbound gateway access.

Mode 7

This mode should be selected when the DAC is connected to a gateway for inbound Hotline operation. The operation of this mode is similar to mode 5 except for the following:

- The DTR lead is ON in the idle state.
- The DTR lead will be dropped OFF for 0.2 second when an established call is disconnected.

The baud rate of inbound Hotline calls is determined by programmable database. The Meridian 1 should be programmed to allow inbound calls only on the DAC unit.

Programing DAC for mode 7 in service change LD11

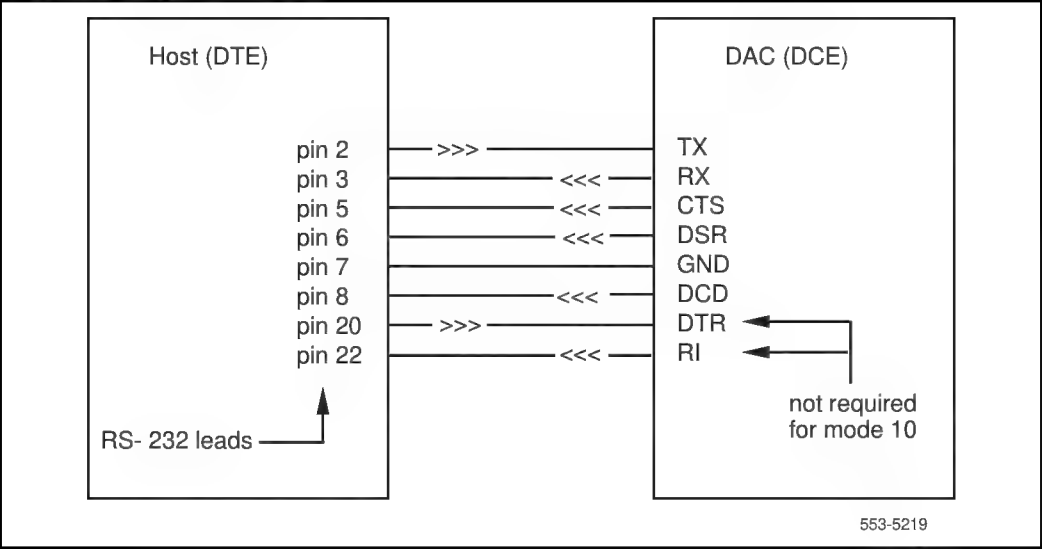
The DAC must be configured as R232 (the Autodial feature is used for this mode). The DAC must not be configured as an ADM trunk.

Selecting the proper mode for Host connectivity

Select modes 8, 9, 10, and 11 when the DAC is connected to different types of hosts (DTE). In these modes, the DAC operates as a DCE and drives DSR, DCD, and RI control leads (see [Figure 6](#)). CTS, DSR, and DCD are driven OFF in the idle state.

The DAC will not send any menu or prompt to the host, nor will it echo any command sent from the host. The CTS, DSR, and DCD will be driven ON until the call is released. An incoming call to the DAC causes the RI lead to go ON for 2 seconds and then OFF for 4 seconds until the call is answered by the host. When the host turns DTR ON, the DAC answers the call. If DM-to-DM protocol exchange is successful, the DAC drives CTS, DSR, and DCD ON. If DTR was already ON, the DAC does not drive RI ON.

Figure 6
DAC to Host connectivity



Mode 8

This mode should be selected when the DAC is connected to a host for host accessing. In this mode, the DAC operates in a similar manner to the MCDS. The hosts used with this mode should have the following characteristics:

Auto-answer capability The host should be capable of monitoring the RI lead for detection of incoming calls. When RI is turned ON by the DAC, the host responds by driving DTR ON, which forces the DAC to answer the incoming call. If the host drives the DTR lead ON all the time, incoming calls will always be immediately answered and the RI lead will not be turned ON by the DAC. If DM-to-DM protocol exchange is successful, the DAC drives CTS, DSR, and DCD ON.

Dynamic control of DTR This feature is required only if the host must be capable of releasing an established call. The host should be able to drop an established data call by driving DTR OFF for more than 100 ms.

Note: If the PBDO parameter in LD11 is ON, then Make Set Busy will be activated when DTR is driven OFF for more than five seconds.

In this mode, the DAC will not send any menus or prompts to the host. However, the host can still originate an outgoing call by blind-dialing (sending commands to the DAC without receiving echoes).

Programing DAC for mode 8 in service change LD11

When used for inbound or outbound host access, the DAC can be configured as R232 or R422 in LD11. When used for both inbound and outbound host access, the DAC must be configured as R232 or R422. When the DAC is programmed as station hunting, outbound host access should be in the opposite direction to the hunting for inbound host access.

Note: If CDR is required, use separate outbound and inbound host access.

Mode 9

This mode should be selected when the DAC is connected to a host and Hotline call origination is required. In this mode, the host will be able to Hotline to a specific data unit by simply driving the DTR lead ON. The transition of DTR from OFF to ON causes the DAC to Hotline to the Autodial DN. The hosts used with this mode should have the following characteristics:

Dynamic control of DTR for call origination The host should be capable of driving the DTR lead from OFF to ON to initiate the Hotline call. If the host always drives the DTR lead ON (not capable of dynamic control), mode 11 should be used.

Dynamic control of DTR for releasing established calls This feature is required only if it is required that the host be capable of releasing an established call. The host should be able to drop an established data call by driving DTR OFF for more than 100 ms.

Programing DAC for mode 9 in service change LD11

The DAC must be configured as R232 or R422 (the Autodial feature is used for this mode). The DAC must not be configured as an ADM trunk.

Mode 10

This mode should be selected when the DAC is connected to a host for inbound host accessing. The host in this mode is not required to monitor RI or drive DTR. This mode is similar to mode 8, except for the following:

- The status of DTR lead is assumed to be always ON, even when the actual condition of that lead is OFF (forced-DTR). The DAC always answers an incoming call regardless of the status of DTR.
- The host cannot release an established data call by driving DTR OFF. As a result, the host cannot initiate call release except with a long break or three short breaks.

In this mode, the DAC does not send any menus or prompts to the host. However, the host can still originate an outgoing call by blind-dialing (sending commands to the DAC without receiving echoes).

Programing DAC for mode 10 in service change LD11

When used for inbound or outbound host access, the DAC can be configured as R232 in LD11. When used for both inbound and outbound host access, the DAC must be configured as R232. When the DAC is programmed as station hunting, outbound host access should be in the opposite direction to the hunting for inbound host access.

Note: If CDR is required, use separate outbound and inbound gateway access.

Mode 11

This mode provides a “virtual leased line” and the meaning of the Forced DTR switch is re-defined. The operation is similar to having a leased line feature, where the connection between two extensions is always established. The DAC does not send any menus or prompts to the host. The baud rate of the Hotline call is determined by switches 6, 7, and 8.

This mode should be selected when the DAC is connected to a host and continuous Hotline operation is required. In this mode, the DAC repeatedly tries to Hotline to the Autodial DN as long as DTR is ON. When the DAC tries to Hotline to a busy Data Module, it activates Ring Again and the connection is established as soon as the called unit is free. After establishing the data call, if the called unit releases the call for any reason, the DAC will automatically try to Hotline again to reestablish the call.

If the data unit being called does not answer the Hotline call, the DAC tries to place another Hotline call once every 40 seconds until the called unit answers. This mode is recommended only when a permanent connection between a host and another data unit is required.

Programing DAC for mode 11 in service change LD11

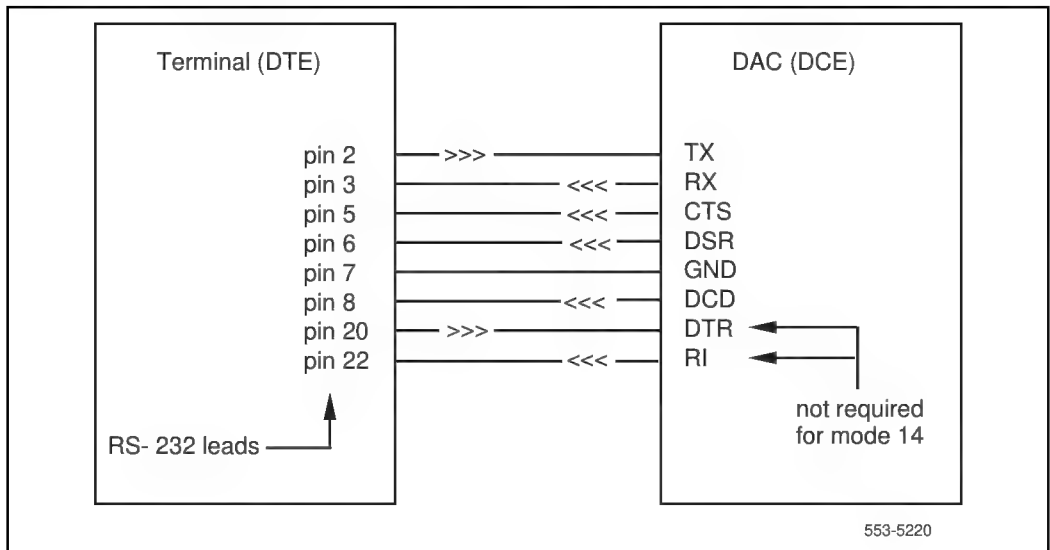
The DAC must be configured as R232 (the Autodial feature is used for this mode). The DAC must not be configured as an ADM trunk.

Selecting the proper mode for Terminal connectivity

Select modes 12, 13, 14, and 15 when the DAC is connected to different types of terminals. In these modes, the DAC operates as a DCE, drives DSR, DCD, and RI control leads, and monitors DTR lead in modes 12, 13, and 15 (see [Figure 7](#)). DTR is ignored in mode 14. All the menus and prompts are sent to the terminals and all the commands from the terminals are echoed. CTS, DSR, and DCD are driven OFF during the idle state (data call is not established).

When the call is released, DSR and DCD are turned OFF for 200 ms. The RI lead is controlled only in modes 12, 13, and 15, and is driven OFF in the idle and connect states. An incoming call to the DAC causes the RI lead to go ON for 2 seconds and then OFF for 4 seconds until the call is answered by the terminal. When the terminal turns DTR ON, the DAC answers the call.

Figure 7
DAC to Terminal connectivity



Mode 12

This mode should be selected when the DAC is connected to a terminal (DTE) for inbound and outbound data calls. This mode is similar to the operation of the ASIM when set to not-forced-DTR and not-Hotline. In this mode, call origination and auto-answer will not be executed by the DAC, unless the DTR lead is driven ON by the terminal. Any terminal that drives the DTR lead ON can be used with this mode (such as VT100 or VT102).

The DAC drives CTS, DSR, and DCD ON, except when a call is dropped or when control—Z is entered during the idle state. In this case, the DAC drives those leads OFF for 0.2 seconds and then ON. When the DTR lead is driven OFF by the terminal, the DAC does not execute autobaud, nor will it respond to any command.

Note: If the PBDO parameter in LD11 is ON, then Make Set Busy will be activated when DTR is driven OFF for more than five seconds.

Programing DAC for mode 12 in service change LD11

The DAC must be configured as R232 or R422 since Autodial, Speed Call, and Display commands are likely to be used.

Mode 13

This mode should be selected when the DAC is connected to a terminal (DTE) and Hotline call origination is required. This mode is similar to the operation of the ASIM when set to not-forced-DTR and Hotline. In this mode, the terminal is able to Hotline to a specific data unit by driving the DTR lead ON. The transition of DTR from OFF to ON causes the DAC to Hotline to the Autodial DN. Any terminal that drives DTR lead ON can be used with this mode (such as VT100 or VT102).

The DAC drives CTS, DSR, and DCD ON, except when a call is dropped. In this case, the DAC drives those leads OFF for 0.2 second and then ON. The baud rate of the Hotline call is determined by the AUTB and BAUD parameters in LD11.

Programing DAC for mode 13 in service change LD11

The DAC must be configured as R232 or R422 since Autodial, Speed Call, and Display commands are likely to be used.

Mode 14

This mode should be selected when the DAC is connected to a terminal (DTE) for inbound and outbound data calls. This mode is similar to the operation of the ASIM when set to forced-DTR and not-Hotline. The terminal used with this mode is not required to drive the DTR lead. This mode of operation is similar to mode 12, except for the following:

- The status of DTR lead is assumed to be always ON, even when the actual condition of that lead is OFF (forced-DTR). The DAC always answers an incoming call regardless of the DTR status.
- The terminal cannot release an established data call by driving DTR OFF. As a result, the terminal cannot initiate call release except with a long break or three short breaks.

Programing DAC for mode 14 in service change LD11

The DAC must be configured as R232 since Autodial, Speed Call, and Display commands are likely to be used.

Mode 15

This mode provides a “virtual leased line” and the meaning of the “Forced DTR” switch is re-defined.

This mode should be selected when the DAC is connected to a terminal (DTE) and continuous Hotline call origination is required. In this mode, the DAC repeatedly tries to Hotline to the Autodial DN as long as DTR is ON. This operation is similar to having a leased line feature, where the connection between two extensions is always established. When the DAC tries to Hotline to a busy Data Module, it activates Ring Again and the connection is established as soon as the called unit is free. After establishing the data call, if the called unit releases the call for any reason, the DAC automatically tries to Hotline again to reestablish the call.

If the data unit being called does not answer the Hotline call, the DAC tries to place another Hotline call once every 40 seconds until the called unit answers. This mode is recommended only when a permanent connection between a terminal and another data unit is required. The baud rate of the Hotline call is determined by the AUTB and BAUD parameters in LD11. The status of CTS, DSR, and DCD is controlled in a similar manner as described in mode 13.

Programing DAC for mode 15 in service change LD11

The DAC must be configured as R232 since Autodial, Speed Call, and Display commands are likely to be used.

Mode selection baud rates

The AUTOB and BAUD parameters in LD11 provide two functions for calls originated from a DAC:

- Provide a way to select a baud rate of a Hotline call. The DAC starts the Hotline operation without receiving a <CR> for autobaud.
- Set the DAC to operate at a fixed baud rate. The DAC does not return the menu or Hotline unless a <CR> is received at the selected baud rate. Normally the DAC should be selected to operate at autobaud.

Note: If AUTOB is set to ON, the BAUD parameter is not prompted. If AUTOB is set to OFF, you may select a fixed baud rate in response to the prompt BAUD.

When the DAC receives a call, it adapts to the caller's baud rate.

See [Table 3](#) for connect and disconnect protocol.

Table 3
Connect and disconnect protocol (Part 1 of 9)

Mode of operation	Interface application	Comments
Mode 0	Inbound and Outbound modem pools For inbound modem pools, most dumb modems may be used. For outbound modem pools, only smart modems (auto-dialer) may be used.	Outbound modem pooling: 1 Modem sends ring/no ring cycle (2 seconds ON, 4 seconds OFF) to initiate connection. 2 DAC responds by driving DTR ON within the first ring cycle. 3 Modem responds by answering the incoming call and driving DCD ON within 35 seconds. 4 If modem does not drive DCD ON within 35 seconds, the DAC drops DTR and goes idle. 5 Remote DTE sends <CR> to the DAC. The DAC autobauds and sends initial prompt. Outbound modem pooling: 1 Local DM user calls to the outbound modem access number. 2 DAC answers the outbound call and drives DTR ON. 3 Modem receives DTR and prepares to receive commands. 4 Local DM user enters the proper commands for calling the remote modem. 5 Remote modem answers; data call established. Call disconnection (DAC): 1 DAC drops DTR if the local DM user drops the call. The modem must drop DCD. 2 DAC drops DTR if the remote modem sends a long break or three short breaks. The modem must drop DCD. Call disconnection (modem): 1 Modem drops DCD (DCD OFF for 100 ms or more). The DAC drops DTR and disconnects the local call. 2 Modem drops DSR (DSR OFF for 100 ms or more). The DAC drops DTR and disconnects the local call.

Table 3
Connect and disconnect protocol (Part 2 of 9)

Mode of operation	Interface application	Comments
Mode 1	Inbound Hotline modem pools Most dumb modems can be used for this application.	Inbound Hotline modem pooling: 1 Modem sends ring/no ring cycle (2 seconds ON, 4 seconds OFF) to initiate connection. 2 DAC responds by trying to establish a Hotline call to a specific Data Module (Autodial). 3 When Data Module answers, then and only then, the DAC turns DTR ON. 4 Modem should answer the incoming call when DTR goes ON and should turn DCD ON within 35 seconds; otherwise the DAC disconnects the call. Call disconnection: Disconnection is the same as mode 0.
Mode 2	Inbound and Outbound modem pools (with forced DTR) Use this mode with Hayes 1200 modem.	Inbound and Outbound modem pooling: The DAC operation is identical to mode 0 except that DTR is always forced ON (except during disconnect). Call disconnection: Disconnection is identical to mode 0 except: — when a call is released, the DAC turns DTR OFF for 0.2 second and then ON. DTR stays ON until the next call release. — The DAC ignores RI and DCD for about 2 seconds after releasing a call. This avoids problems with the Hayes 1200 modem.
Mode 3	Inbound Hotline modem pools (with forced DTR) Use this mode with Hayes 1200 modem.	Inbound Hotline modem pooling: The DAC operation is identical to mode 1 except that DTR is always forced ON (except during disconnect). Call disconnection: Disconnection is identical to mode 2.

Table 3
Connect and disconnect protocol (Part 3 of 9)

Mode of operation	Interface application	Comments
Mode 4	Inbound and Outbound Gateway access	Inbound Gateway connection protocol: 1 Gateway raises DCD to initiate connection. 2 DAC responds by driving DTR ON. 3 Gateway does not have to turn DSR ON. However, toggling DSR or DCD from ON to OFF causes the DAC to disconnect the call. 4 Gateway user sends <CR> to the DAC. 5 DAC autobauds and sends the initial prompt to the Gateway. Outbound Gateway connection protocol: 1 Local DM user calls the DAC that is connected to a Gateway. 2 DAC answers the data call and drives DTR ON. 3 Gateway receives DTR and prepares to receive commands. 4 Local DM user is now transparently connected to the Gateway. 5 Gateway is expected to drive DCD ON within 35 seconds. If the Gateway fails to do so, the DAC drops DTR and the call. Call disconnection (DAC): 1 DAC drops DTR if the local DM user drops the call. The Gateway must drop DCD. 2 DAC drops DTR if the DAC receives a long break or three short breaks. The Gateway must drop DCD. Call disconnection (Gateway): 1 Gateway drops DCD (DCD OFF for 100 ms or more). The DAC drops DTR and disconnects the local call. 2 Gateway drops DSR (DSR OFF for 100 ms or more). The DAC drops DTR and disconnects the local call.

Table 3
Connect and disconnect protocol (Part 4 of 9)

Mode of operation	Interface application	Comments
Mode 5	Inbound Hotline Gateway access	Inbound Hotline Gateway protocol: 1 Gateway raises DCD to initiate connection. 2 DAC responds by trying to establish a Hotline call to a specific Data Module (Autodial). 3 When Data Module answers, then and only then, the DAC turns DTR ON. 4 Gateway does not have to turn DSR ON. However, toggling DSR or DCD from ON to OFF causes the DAC to drop the call. 5 Gateway is not transparently linked to the equipment connection to the DM. Call disconnection: Disconnection is identical to mode 4.
Mode 6	Inbound and Outbound Gateway access (with forced DTR)	Inbound and Outbound Gateway protocol: The DAC operation is identical to mode 4 except that DTR is always forced ON (except during disconnect). The establishment of the outbound call does not require DCD to be driven ON by the Gateway. Call disconnection: Disconnection is identical to mode 4 except that when a call is released, the DAC turns DTR OFF for 0.2 second and then ON. DTR stays ON until the next call release.
Mode 7	Inbound Hotline Gateway access (with forced DTR)	Inbound Hotline Gateway protocol: The DAC operation is identical to mode 5 except that DTR is always forced ON (except during disconnect). Call disconnection: Disconnection is identical to mode 6.

Table 3
Connect and disconnect protocol (Part 5 of 9)

Mode of operation	Interface application	Comments
Mode 8	Host access for call origination and answering	Host answering an incoming data call: 1 Local DM user dials the access number to initiate the connection. 2 DAC responds by driving RI ON for 2 seconds and OFF for 4 seconds until the Host answers by turning DTR ON. (If the Host always drives DTR ON, the DAC immediately answers the call without driving RI ON.) 3 When Host receives RI ON, it should respond by turning DTR ON. 4 DAC answers when it receives DTR ON. 5 DAC turns DSR, DCD, and CTS ON when the call is completely established. The local DM user is now transparently linked to the Host. Host originating a data call: 1 Host turns DTR ON to initiate the connection. 2 DAC prepares to receive <CR> for autobaud. 3 Host sends <CR> followed by other commands for establishing a data call (the DAC does not echo a command, nor does it send any prompt to the Host (blind dialing)). 4 When the data call is completely established, the DAC turns DSR, DCD, and CTS ON as long as the call is connected. Call disconnect ion (DAC): 1 DAC drops DSR, DCD, and CTS if the local DM user releases the call. The Host should then drop the call. 2 DAC drops DSR, DCD, and CTS if the Host sends a long break or three short breaks. The Host should then drop the call. Call disconnection (Host): The Host toggles DTR from ON to OFF (DTR must be OFF for 100 ms or more). The DAC drops DSR, DCD, and CTS and disconnects the local call.

Table 3
Connect and disconnect protocol (Part 6 of 9)

Mode of operation	Interface application	Comments
Mode 9	Hotline call origination	Hotline originated by Host (Inbound): 1 Host toggles DTR from OFF to ON to initiate the Hotline call. 2 DAC responds by trying to establish a Hotline call to a specific Data Module (Autodial). 3 When Data Module answers, then and only then, the DAC turns DSR, DCD, and CTS ON (the DAC does not send any prompts to the Host). If the Data Module is busy or not responding, the DAC requires another transition of DTR from OFF to ON to initiate another Hotline call. If the Host keeps DTR ON, the DAC does not try to establish another Hotline call, unless the Host sends a <CR> while DTR is ON. Call disconnection: Disconnection is identical to mode 8.
Mode 10	Host access for call origination and answering (with forced DTR)	Host access for call origination and answering: The DAC operation is identical to mode 8 except DTR is always considered ON, even when the Host is driving DTR OFF. Call disconnection: 1 DAC drops DSR, DCD, and CTS if the local DM user releases the call. The Host should then drop the call. 2 DAC drops DSR, DCD, and CTS if the Host sends a long break or three short breaks. The Host should then drop the call.

Table 3
Connect and disconnect protocol (Part 7 of 9)

Mode of operation	Interface application	Comments
Mode 11	Hotline call origination (Virtual Leased Line)	Hotline origination by Host (continuous Hotline mode): The DAC operation is similar to mode 9 except the Host initiates the Hotline call by driving DTR ON. However, if the DM is busy or not answering, the DAC will continuously try to originate Hotline calls once every 40 seconds (as long as DTR stays ON) until the called DM answers the call. Call disconnection: Disconnection is identical to mode 8.
Mode 12	Terminal access for call origination and answering	Terminal answering an incoming data call: 1 DAC drives DSR, DCD, and CTS ON in the idle state. 2 Local DM user dials the access number to initiate the connection. 3 DAC responds by driving RI ON for 2 seconds and OFF for 4 seconds, until the terminal answers by turning DTR ON (if the terminal always drive DTR ON, the DAC immediately answers the call without driving RI ON). 4 When terminal receives RI ON, it should respond by turning DTR ON. 5 DAC answers when DTR goes ON and the local DM user is now transparently linked to the terminal. Terminal originating an outgoing data call: 1 DAC drives DSR, DCD, and CTS ON in the idle state. 2 Terminal turns DTR ON to initiate the connection. 3 DAC prepares to receive <CR> for autobaud. 4 Terminal sends <CR> followed by other commands for establishing a data call (the DAC echoes all commands).

Table 3
Connect and disconnect protocol (Part 8 of 9)

Mode of operation	Interface application	Comments
		Call disconnection (DAC): If the local DM user releases the call, the DAC turns DSR, DCD, and CTS OFF for 0.2 second and then ON. Call disconnection (terminal): 1 Terminal toggles DTR from ON to OFF (DTR must be OFF for 100 ms or more). The DAC turns DSR, DCD, and CTS OFF for 0.2 second and then ON. 2 Terminal sends a long break or three short breaks. The DAC turns DSR, DCD, and CTS OFF for 0.2 second and then ON.
Mode 13	Hotline call origination	Hotline originated by terminal: 1 DAC drives DSR, DCD, and CTS ON in the idle state. 2 Terminal toggles DTR from OFF to ON to initiate Hotline call. 3 DAC responds by trying to establish a Hotline call to a specific DM (Autodial). 4 If Data Module is busy or not responding, the DAC requires another transition of DTR from OFF to ON to initiate another Hotline call. If the terminal keeps DTR ON, the DAC does not try to establish another Hotline call unless the terminal sends a <CR> while DTR is ON. Call disconnection: Disconnection is identical to mode 12.
Mode 14	Terminal access for call origination and answering (with forced DTR)	Terminal access for call origination and answering: The DAC operation is identical to mode 12 except that DTR is considered to be always ON, even when the terminal is driving DTR OFF.

Table 3
Connect and disconnect protocol (Part 9 of 9)

Mode of operation	Interface application	Comments
		Call disconnection (DAC): If the local DM user drops the call, the DAC turns DSR, DCD, and CTS OFF for 0.2 second and then ON. Call disconnection (terminal): The terminal sends a long break or three short breaks. The DAC turns DSR, DCD, and CTS OFF for 0.2 second, and then ON.
Mode 15	Hotline call origination (Virtual Leased Line)	Hotline call origination by terminal: The DAC operation is similar to mode 13 except the terminal initiates the Hotline call by driving DTR ON. However, if the called DM is busy or not answering, the DAC will continuously try to originate Hotline calls once every 40 seconds (as long as DTR remains ON) until the Data Module answers the call. Call disconnection: Disconnection is identical to mode 12.